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TESTIMONY

Potential Effects of Chinese Aerospace Capabilities on U.S. Air Force Operations

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Potential Effects of Chinese Aerospace Capabilities on U.S. Air Force Operations[2,3]

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Introduction

As China continues to modernize its military at a pace commensurate with its growing economic power, it is important for U.S. decision-makers to regularly evaluate the balance between observed Chinese capabilities and U.S. forces. Although armed conflict between the United States and China is extremely unlikely and would likely be mutually destructive, there are important shaping, deterrence and stability reasons for ensuring that the U.S. is well-prepared for contingencies involving China. A conflict over Taiwan has been a long-standing concern but is not the only scenario where the United States and China could become militarily involved. For instance territorial disputes in the South and East China Seas could be sources of future conflict, and other issues involving nations in South or Southeast Asia are also plausible. With the various countries and competing claims that may be involved, these situations could become even more complex than a China-Taiwan scenario.

Key Elements of Modernization

As outlined in the 2009 "Military Power of the People's Republic of China" report from the Department of Defense (DoD), China is simultaneously modernizing several aspects of its military capabilities. For the U.S. military, three particular aspects of this modernization hold the most potential to affect traditional means of power projection and the types of operations that it has come to rely on. These three modernization thrusts are anti-access threats to U.S. basing, state-of-the-art surface-to-air missiles (SAM) defenses and a 4th generation air force with precision air-to-ground and air-to-air capabilities.

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[3] This testimony stems from work conducted in RAND Project AIR FORCE and in RAND National Security Research Division.

Before we discuss each modernization effort specifically, it is important to recall that simply purchasing equipment does not give a military force an operational capability. Effective testing, ongoing and realistic training, peacetime support, sufficient wartime maintenance and robust connections to supporting elements such as targeting information and command and control must accompany that equipment. This is particularly critical for forces that must operate at long ranges and interoperate with other services. In an environment like the Taiwan Strait, multiple branches of the Chinese military would be operating simultaneously in a small area, creating opportunities for confusion, uncertainty and fratricide. However, China appears to have recognized at least some of these difficulties and may be making efforts to address them. The 2009 Military Power report refers to enhanced training for strike aircraft, electronic warfare, carrier air, and ground forces. It also discusses exercises occurring across military regions for joint and combined-arms operations and the existence of a dedicated adversary force. Despite these efforts, it is interesting to note large Chinese investments in systems such as ballistic missiles which do not require "interoperability" *per se* and which can be quite effective even when operating with a pre-set plan and little communication from higher headquarters.

In the last several years, multiple authors have highlighted the anti-access threat that China is creating through its procurement of tactical ballistic missiles (TBM) and ground-launched cruise missiles (GLCM). These two systems may soon be joined by air-launched cruise missiles (ALCM) and an air force capable of precision air-to-ground strikes. If we examine the six main U.S. Air Force (USAF) bases in the region against the non-nuclear threats listed in the 2009 Military Power report (excluding the 700-750 shorter-range CSS-7 missiles), we see that Osan and Kunsan air bases in South Korea (400 km from the closest point in China) could face up to 480 TBM and 350 GLCM; Kadena (650 km from China), Misawa (850 km or 1000 km if overflight of Russia is avoided) and Yokota (1100 km from China) airbases on Japan face 80 TBM and 350 GLCM; while Andersen AFB (3000 km from China) on Guam is currently free from threat. However, there appear to be signs of long-range cruise missiles being fitted to H-6 bombers that could soon allow air-launched cruise missiles to reach Andersen, and China clearly possesses the technology to produce conventional ballistic missiles that could reach Andersen as well, if it chose to develop them. The report also discusses possible anti-ship ballistic missiles under development, which could be used to threaten U.S. aircraft carriers.

RAND has looked at the effects of various TBM and cruise missile warheads against airbase targets, and numbers on the order of 30-50 TBM per base appear to be sufficient to overload and kill air defenses, cover all of the open parking areas with submunitions to destroy aircraft parked there, and crater runways such that aircraft cannot takeoff or land. If 30-50 cruise missiles were

fired along with the TBMs, they would complicate the air defense problem and could also damage or destroy a squadron's worth of aircraft shelters. There would likely also be damage to other critical airbase systems such as fuel storage and handling or maintenance facilities and equipment. Following such an attack, U.S. forces would have to extinguish burning aircraft, clear the airfield of debris and unexploded ordnance, repair runway craters and fly in replacement aircraft and support equipment before the base could generate useful combat sorties.

If we compare the numbers of missile required to close bases with the numbers that China is currently fielding, clearly the U.S. could face extended periods of time where few, if any, of our bases near China are operating. RAND analysis has estimated that in the near-future, even with conservative estimates on TBM production, Kadena could be kept closed to fighter operations for at least a week and kept closed to heavy aircraft such as tankers, bombers and intelligence, surveillance and reconnaissance (ISR) aircraft (which require longer runways and hence more crater repairs) for much longer. Alternatively, some of these missiles could be used to close multiple bases for shorter periods, although hundreds of GLCM are also available to contribute to that task.

These anti-access concerns are sometimes dismissed as too escalatory or counter-productive for China to undertake. The argument is that attacking U.S. bases in South Korea or Japan would fully bring those countries into the conflict, resulting in a net negative for China's ambitions in the region. Similarly, attacking Andersen airbase on Guam, which is a U.S. territory, would force the U.S. to fully react and bring much more force to bear than it otherwise would consider using in a conflict with China. Although these arguments have merit, there are several reasons why this viewpoint should not dominate U.S. planning. First, given the mismatch in capabilities between U.S. and Chinese forces, China simply cannot allow the U.S. to freely operate from bases near Taiwan and expect to achieve its objectives. Since attacking basing appears to be prerequisite for success, and China appears to recognize this fact, U.S. military planners should assume that such attacks might occur. Second, Chinese writings and equipment procurements are clearly becoming oriented to attacking not only Taiwan, but targets further afield. If China saw no self-interest in attacking bases in Japan and beyond, it is difficult to see the need for conventional CSS-5 TBMs, long-range GLCMs and air-launched cruise missiles on bombers. It is unlikely that China would consider these locations to be *a priori* off-limits after having invested so much in the ability to attack them. And finally, even if the U.S. became convinced of Chinese unwillingness to attack regional bases, the mere existence of potential threats to these bases should cause planners to create robust alternatives to their use.

The upgrades of SAMs and fighter aircraft are often grouped together under the term “area denial” to capture the sense of portions of battlespace being made too risky for U.S. operations. Indeed, the 2009 Military Power report highlights that the air defense over Chinese territory is becoming quite saturated with modern SAMs and defensive fighters. In the case of a China-Taiwan scenario, a key element of this area denial capability is that the threatened airspace is not only over Chinese territory, but is being extended over the Taiwan Strait and soon over Taiwan as well by long-range land- and ship-based SAMs and 4th generation air-to-air fighters. A 200 km range S-300PMU2 SAM on the Chinese mainland has coverage over 50 km of Taiwanese territory. A LUZHOU-class DDG with an SA-N-20 SAM in the middle of the Strait could engage airborne targets over most of Taiwan. In terms of fighters, there appear to be approximately 15 Chinese military airbases within 600 km of the Taiwanese capital (there are 40 within 1000 km) and it appears China will soon be able to employ between 500 and 1000 aircraft in a campaign against Taiwan, 20-30% of them with modern 4th generation capabilities such as precision air-ground weapons. Within five to ten years this fraction could easily exceed 50% with reasonable production rates.

Although the USAF is well trained and equipped to deal with 4th generation fighters and modern SAMs, the combination of capabilities that China appears to be creating could cause significant additional risk. For example, an isolated, well-located modern SAM does not pose a major challenge to the U.S.; but two or three operating in range of each other, with one or more of them unlocated and with threat fighters in the area, is a very different story. Similarly, a four-ship of Su-27 Flankers is quite a bit more challenging for today’s USAF when they are equipped with active radar missiles and effective electronic warfare and are supported by an airborne command and control aircraft and long-range SAMs. This challenge is obviously compounded if the threat is 24 Flankers instead of four and the U.S. command and control aircraft was forced to leave the area for its own safety. As this type of defense expands to cover more of Chinese territory, U.S. military options are constrained. If China can extend these capabilities over Taiwan as well, our ability to defend Taiwan also becomes circumscribed and other regional contingencies could also be hampered.

Effect of Modernization on U.S. Air Operations

In the recent past, the U.S. responded to contingencies with rapid deployments of large numbers of fighters to bases and on aircraft carriers close to the conflict. Smaller numbers of bombers, tankers and ISR aircraft would be deployed to somewhat more distant locations in support. The fighters, which would at least match in number and greatly exceed in capability those of any adversary, would quickly gain air superiority over friendly territory, allowing heavy use of ISR and

tankers close to the enemy. With the USAF and USN's overwhelming advantage in air-to-air and the suppression of enemy air defenses (SEAD), this air superiority could then be extended over the enemy's territory and allow virtually any target or ground force to come under rapid and heavy attack by fighters and bombers flying around the clock.

However, the on-going improvement in Chinese SAMs, air-to-air and air-to-ground fighters and anti-access missile capabilities, if accompanied by appropriate training and support, could soon create a series of interlocking challenges for this paradigm of air operations. The root of the issue is the looming mismatch between U.S. basing options in the region and Chinese base attack capabilities. If aircraft carriers near Taiwan and airbases in Japan and South Korea can be attacked (or threatened to the extent that the U.S. is politically unable to utilize them) to the extent that sorties generated from them are significantly limited, operations from more distant locations such as Guam become the only remaining option. Furthermore, as discussed above, threats to bases at these longer ranges appear to be emerging as well, particularly to larger aircraft such as tankers, bombers and ISR aircraft that require long runways. If basing at Guam could be damaged and sortie generation limited or halted, the U.S. would be left with few, if any, options for providing land-based fighter sorties.

The limit on sorties that the anti-access threat creates has several second-order effects. For instance, one of the primary USAF missions in a conflict is likely to be the maintenance of air sovereignty. Whereas in the past we could match Chinese numbers and exceed Chinese capability, in the near future, if U.S. basing is attacked, China is likely to be able to exceed the sortie numbers we can generate and begin to approach the capability of the 4th generation fighters making up the bulk of our forces. This situation is exacerbated by the SAM threat, which reaches close to Taiwan from the mainland and can be pushed further forward by ship-based air defenses. To avoid the SAMs, non-stealthy 4th generation fighters would either be forced to remain behind Taiwan or operate at lower altitudes, which puts them at further disadvantage in air-to-air combat. Although the U.S. is in process of modernizing its fighter fleet to regain a capability edge, the small size of the F-22 force and the delayed entry of the F-35 mean that the overall gap is unlikely to close in the near term.

The shortage of fighter sorties also makes it difficult to conduct attack operations and protect the vulnerable bomber, ISR and tanker aircraft that enable them. Since the key threats are China's force of strike aircraft and short-range ballistic missiles, finding and killing targets like air bases, air defenses and ballistic missile launchers and infrastructure could be high priority U.S. missions. Although cruise missile strikes from ships and submarines would play an important role, the numbers and types of missiles currently available are not likely to be sufficient to significantly

degrade Chinese attacks. Attacks on well-protected targets generally require large force "packages" of aircraft to provide the mutual support necessary to find targets, survive and suppress defenses and employ sufficient weapons. This is particularly true when facing the modern SAMs and aircraft that China is fielding, which can relocate and mutually protect each other. Attacking mobile targets requires persistence in the target area and survivable ISR. Even cruise missile strikes against fixed targets, which are typically conducted by bombers operating from standoff ranges, will require fighter protection from long-range interceptors such as the Su-27 (although longer-ranged weapons could reduce this demand). Hard and buried targets require attacks by weapons generally carried by bombers to within close range of the target. With distant and damaged basing, these packages of attack and support aircraft become difficult to form, difficult to refuel, and difficult to keep on-station.

Perhaps even more concerning than these practical effects, however, is the destabilizing nature of the Chinese threat matched against traditional Air Force operations. The typical U.S. response to rising tensions anywhere in the world is to begin to deploy forces, especially naval and land-based airpower, into the theater to dissuade, deter, and if necessary, coerce an adversary. Since these forces have operated from near sanctuary, this strategy has worked to U.S. advantage. If the U.S. were left alone to operate from bases near China, this would likely be the case in the Pacific as well. Thus, China may feel that its only hope for victory is to attack U.S. forces as they deploy into theater. The very effectiveness of U.S. airpower, coupled with their vulnerability in this theater, has created an incentive for attack, not stability.

Options for Improvement

Despite the rather significant obstacles to military operations in the Pacific that are looming on the horizon, there are several steps the DoD can take to mitigate them and in turn improve deterrence and stability in the region. Although none can be accomplished without investment, most are quite a bit smaller in size than purchasing a new platform. With a focus on providing secure basing for fighters and improving operational flexibility, analyses at RAND and other institutions have brought to light several high leverage areas:

- Increase the number of airbases and their hardness
- Solidify regional basing arrangements
- Improve long-range strike capability
- Increase operational coordination between the Air Force and Navy
- Continue modernization of fighter force
- And to the greatest extent possible, encourage Taiwan and other partners to pursue defensive systems that are more survivable and effective against attack

The first measure, improved basing, would consist of two types of activities. First, the number of operating surfaces at locations near Guam could be expanded. There are several nearby islands such as Saipan, Tinian, Rota, Yap and Palau that could accommodate smaller bases with a moderate number of support facilities. If tensions with China escalated, personnel, fighters and support equipment would flow to these dispersed operating locations. Second, bases in this region need to be made more survivable against rapid and comprehensive destruction of aircraft parked in the open, runways, and fuel storage. Thus, current and new airbases need to be equipped with some type of shelter for fighters and their fuel to offer protection against light submunitions. Active defenses could also play a significant role at these ranges since they are less likely to be overwhelmed with numbers.

Together, these measures would make a Chinese anti-access strategy much more difficult to execute. Since the U.S. would be operating at 3,000 km from China, threats to these locations would be quite expensive, and hence less numerous. Having multiple operating locations directly multiplies the number of threat missiles required, as does survivable aircraft parking and operating surfaces. However, these efforts will not be effective at protecting large aircraft, such as tankers and bombers. These aircraft remain critical to U.S. operations to refuel fighters operating at long ranges and to provide strike capability.

Since the U.S. is unlikely to be able to keep runways open to operate large aircraft from inside the threat ring, the need for expanding and clarifying basing options with regional allies is magnified. To take one example, expanded basing options with a nation such as Australia could allow the U.S. to fly fighters from expanded basing options on or near Guam and refuel them with tankers flying from bases in Northern Australia from outside most threats. There may be similar opportunities with other nations in the region, particularly for non-combat missions such as ISR and refueling. Arrangements such as this would obviously require long and delicate negotiations involving many arms of the U.S. government, and hence cannot be delayed until tensions rise.

The third improvement, increasing the capability of long-range strike, would allow us to take advantage of the expanded, but still distant, basing options just discussed. Greater use of long-range strike with standoff munitions also reduces the tanker burden, employs more munitions per sortie and reduces the need for SEAD as compared to conducting strikes with fighters. Although the DoD has been examining future needs for long-range strike for several years, it is not likely that a new platform would be available in the near- or mid-term timeframes. Thus, more rapid and less expensive options should be considered. These include increasing the weapons carriage

capacity of B-52 bombers and exploring options for allowing bomber training aircraft to temporarily deploy and support combat operations.

Most importantly, however, the U.S. will need to expand the quantities and capabilities of long-range cruise missiles. As outlined above, critical targets such as airbases will be very difficult to attack directly with current fighters and bombers. Analysis by RAND has indicated a need for several thousand long-range cruise missiles, with anti-ship, unitary, penetrating and submunition warhead variants. The primary USAF cruise missile is planned to be the Joint Air-to-Surface Standoff Missile (JASSM), but its range does not allow access to many targets in a country as large as China. The baseline JASSM might be particularly useful in an anti-ship variant where the longest range is not needed. The procurement plan for the extended-range variant (JASSM-ER) is for relatively small quantities. Air-launched AGM-86C and ship- and submarine-based Tomahawk missiles would be available in the theater as well, but in quantities of hundreds, not thousands. The Tomahawks are also good candidates for an anti-ship variant since their launchers are continually on-station and could react quickly to Chinese ship movements.

As highlighted by the cruise missile situation, increased cooperation between the Air Force and Navy could pay high dividends given the level of threat and diversity of missions likely to be needed. For many missions, such as air superiority over Taiwan, maritime interdiction and SEAD, elements from both services will be needed. For this to happen, it will be critical that the services integrate at several different levels. For instance, ISR platforms from one service may need to be able to target weapons for the other, assets from one will likely need to contribute to force protection for the other, and both will likely need to take on less-traditional missions such as maritime interdiction by the Air Force and airbase defense by the Navy.

The Air Force is currently modernizing from a 4th generation (primarily F-15 and F-16 aircraft) to a 5th generation (F-22 and F-35) fighter force. Although the threat to bases in region would seem to call into question large investments in relatively short-range fighters, the reality is somewhat more complicated. Since there are several missions that appear to be most effectively accomplished in the foreseeable future by fighters, air-to-air and SEAD to take two examples, fighter demand is unlikely to go away. The advantages of moving from 4th generation to 5th generation fighters are several. Their stealth characteristics obviously make them more survivable, reducing the need for large support packages. Their modern and integrated sensor suites are more resistant to jamming and reduce the need for offboard ISR assets that require their own basing and support. This combination of high survivability and high effectiveness means that fewer are needed to accomplish the same missions, which is exactly what is needed in anti-access scenarios. Although heavier reliance on long-range strike may eventually reduce the number of fighters

required, operations from longer ranges also increases the requirement, making it difficult to forecast an ideal future mix of fighters and bombers.

Finally, providing proper support and equipment to regional partners could reduce many of the demands placed on the U.S. For example, improved Taiwanese capabilities in survivable air defenses, anti-ship missiles and indirect fires would go a long way to reducing current vulnerabilities. Mobile SAMs that relocate one or twice a day and limit their radar emissions could cause quite a challenge to Chinese forces. Mobile anti-ship and short-range surface-to-surface missiles are a survivable approach to blunt an invasion force. These could be supported by small tactical hand- or vehicle-launched UAVs to provide targeting information. Defense planning in the region is obviously the responsibility of each nation, but the U.S. should encourage the most appropriate and useful capabilities when possible.

Conclusions

Although many believe that the likelihood of armed conflict between the United States and China is low, the recently completed Quadrennial Defense Review is quite clear that, "U.S. forces must be able to deter, defend against, and defeat aggression by potentially hostile nation-states" in an anti-access environment. If the U.S. wishes to remain relevant in the Pacific, we are likely to need to respond to Chinese modernization in an intelligent and effective way. Any U.S. response should be focused on increasing the deterrent effect of our force posture and providing commanders a broader set of stabilizing options in the face of increasing tensions. Given current fiscal pressures, ongoing counter-insurgencies and the need to consider requirements in other possible scenarios, these responses must also be carefully considered for their overall cost. If properly done, important U.S. military shortcomings can be bolstered at reasonable cost and with positive effects on overall stability in the Western Pacific.